PROPYLENE DICHLORIDE

Propylene dichloride is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 78-87-5 $CH_3CHClCH_2Cl$

Molecular Formula: $C_3H_6Cl_2$

Propylene dichloride is a liquid with a chloroform-like odor. It is slightly soluble in water and miscible with organic solvents. Although it is flammable and has a low flash point, it does not catch fire readily in industrial applications (Merck, 1983).

Physical Properties of Propylene Dichloride

Synonyms: 1,2-dichloropropane; propylene chloride

Molecular Weight:	112.99
Boiling Point:	95 - 96 ^oC
Melting Point:	-100.4 ^oC
Flash Point:	21 ^oC (open cup)
Vapor Density:	3.9 (air = 1)
Density/Specific Gravity:	1.159 at 25/25 ^oC (water = 1)
Vapor Pressure:	49.67 mm Hg at 25 ^oC
Log Octanol/Water Partition Coefficient:	1.99
Henry's Law Constant:	$2.07x10^{-3}$ atm-mole/m^3
Conversion Factor:	1 ppm = 4.62 mg/m^3

(Howard, 1990; HSDB, 1993; Merck, 1983; Sax, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Propylene dichloride is used as a chemical intermediate for the production of carbon tetrachloride and perchloroethylene; as a lead scavenger for antiknock fluids; as a solvent; in ion exchange resin manufacture; in paper coating products; as a scouring or spotting agent; as a metal degreasing agent; and as an insecticide (HSDB, 1993).

The primary stationary source that reported emissions of propylene dichloride in

California are hospitals, sanitary services, and secondary nonferrous metal manufacturing facilities (ARB, 1997b).

Propylene dichloride was registered for use as a pesticide; however as of August 1, 1990, it is no longer registered for pesticidal use in California (DPR, 1996).

B. Emissions

The total emissions of propylene dichloride from stationary sources in California are estimated to be less than one pound per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of propylene dichloride was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of propylene dichloride. However, the United States Environmental Protection Agency (U.S. EPA) has compiled ambient air data from several locations throughout the United States from 1979-85. This data showed, in urban locations, a mean ambient concentration of 0.75 micrograms per cubic meter ($\mu g/m^3$) or 0.16 parts per billion for propylene dichloride (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information on indoor sources and concentrations of propylene dichloride was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Propylene dichloride exists in the atmosphere in the gas phase. The dominant atmospheric loss process for propylene dichloride is by reaction with the hydroxyl (OH) radical. Based on this reaction, the atmospheric half-life and lifetime of propylene dichloride is estimated to be about 20 days and 30 days, respectively (Kwok and Atkinson, 1995). Due to its moderately high water solubility, propylene dichloride may also be removed by rain (Howard, 1990).

AB 2588 RISK ASSESSMENT INFORMATION

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics "Hot Spots" Program (AB 2588). Of the risk assessments reviewed as of December 1996, for non-cancer health effects, propylene dichloride was not listed in any of the risk assessments (OEHHA, 1996b).

HEALTH EFFECTS

Probable routes of human exposure to propylene dichloride are inhalation, ingestion, and dermal contact (Howard, 1990).

Non-Cancer: Propylene dichloride vapors are very irritating to the eyes and respiratory tract. It causes central nervous system depression and liver, kidney and nervous system toxicity in animal studies (U.S. EPA, 1994a; Sittig, 1991).

The U.S. EPA has established a Reference Concentration (RfC) of 4 $\mu g/m^3$ for propylene dichloride based on hyperplasia of the nasal mucosa in rats. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects. The U.S. EPA has not established an oral Reference Dose (RfD) for propylene dichloride (U.S. EPA, 1994a).

Limited information is available on adverse human reproductive and developmental effects caused by exposure to propylene dichloride. Animals exposed to propylene dichloride via gavage have shown an increased incidence of delayed ossification of the bones of the skull, as well as adverse reproductive effects including testicular degeneration and infections of the ovary, uterus, and other organs (U.S. EPA, 1994a).

Cancer: No studies are available regarding carcinogenic effects of propylene dichloride in humans. Tumors have been seen in animals given propylene dichloride by gavage. The U.S. EPA has classified 1,2-dichloropropane (propylene dichloride) as Group B2: Probable human carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified propylene dichloride (1,2-dichloropropane) in Group 3: Not classifiable as to carcinogenicity (IARC, 1987a).

The State of California has determined under Proposition 65 that propylene dichloride (1,2-dichloropropane) is a carcinogen (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is 1.8×10^{-5} (microgram per cubic meter)$^{-1}$ (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to 1 microgram per cubic meter of propylene dichloride is estimated to be no greater than 18 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 6.3×10^{-2} (milligram per kilogram per day)$^{-1}$ (OEHHA, 1994).